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Metabolic Syndrome Is Associated with Health-Related Quality of Life in Suspected Patients with Nonalcoholic Steatohepatitis

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Significance of the Study

- In this study, the effect of metabolic syndrome on health-related quality of life (HRQOL) was examined in patients with suspected nonalcoholic steatohepatitis. A significant association between metabolic syndrome and HRQOL was observed in these patients. This finding could be useful in therapy and in devising health policy.

Keywords
Metabolic syndrome · Nonalcoholic steatohepatitis · Quality of life · Twelve-Item Short-Form Health Survey

Abstract

Objective: This study was designed to examine the effect of metabolic syndrome (MetS) on health-related quality of life (HRQOL) in patients with suspected nonalcoholic steatohepatitis (NASH). ***Subjects and Methods:*** Three hundred thirty-two patients (236 males and 96 females) with suspected NASH from the Amol cohort study were included in this study. MetS was diagnosed based on Adult Treatment Panel III criteria and HRQOL was measured using the 12-Item Short-Form Health Survey (SF-12) questionnaire (with 8 subscales and 2 summary components). A multivariable linear regression model was used to assess the independent effect of MetS on HRQOL. ***Results:*** The mean age of the study population was 42 ± 13 years (range 18–82). The prevalence of MetS was 43.4% ($n = 144$) and the mean scores on the Physical Component Summary (PCS) and the Mental Component Summary were 72.4 ± 20.86 and 42.7 ± 12.42, respectively. The multivariable linear regression model showed that MetS was negatively associated with 4 subscales of HRQOL that included: role limitations due to physical problems (RP) ($B = -14.05$, $p = 0.004$), bodily pain (BP) ($B = -7.37$, $p = 0.02$), vitality (VT) ($B = -7.72$, $p = 0.022$), and role limitations due to emotional problems (RE) ($B = -12.67$, $p = 0.005$) after adjustment for other

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variables. Also, MetS had a borderline association with the general health and mental health subscales and the PCS ($p < 0.1$). ***Conclusion:*** In this study, there was a strong association between MetS and 4 subscales (RP, BP, VT, and RE) of HRQOL in patients with suspected NASH; this could be considered as a part of health policy to improve general health.

Introduction

With the increasing trend toward overweight and obesity in developing countries [1], health policy-makers are progressively faced with the problems and dilemmas related to nonalcoholic fatty liver disease (NAFLD) [2]. The spectrum of this disease ranges from simple steatosis to cirrhosis and eventually hepatocellular carcinoma. Currently NAFLD is considered the most prevalent chronic liver disease in many countries including Iran [3]. NAFLD is a complex metabolic condition in which both lifestyle and genetic factors have a pathogenic role and it has been increasingly recognized as a major cause of liver-related morbidity and mortality [4, 5]. In this setting, nonalcoholic steatohepatitis (NASH) is histologically determined by hepatic steatosis and cellular damage with features of inflammation and/or fibrosis [6, 7]. NASH may progress to liver fibrosis or cirrhosis and it is likely that this disease could become the most common cause of liver-related mortality in the near future [8]. The pathogenesis of NAFLD/NASH is not clear, and many hypotheses had been proposed. Obesity, diabetes mellitus, and dyslipidemia have been reported as predisposing risk factors for NASH [7]. Due to the variety in the pathogenesis of NAFLD, its clinical presentation may be different. Many patients with NAFLD/NASH are asymptomatic [9]. Some comorbidities such as metabolic syndrome (MetS) and obesity might occur in NAFLD/NASH patients [10], but MetS is a common comorbidity in subjects with NAFLD/NASH and could affect their health-related quality of life (HRQOL). There have been only a few studies (especially in our region) assessing the link between MetS and HRQOL in NAFLD/NASH patients [11, 12]. Most studies have evaluated MetS status and QOL in NAFLD/NASH patients separately. Also, considering the social and economic burden of NAFLD/NASH, it is estimated that knowing the HRQOL and associated factors (especially MetS) of patients could be of great importance in health policy-making as well as in therapy.

The hypothesis of this study was that HRQOL scores in suspected NASH patients would be associated with MetS. Thus, the aim was to evaluate the effects of MetS on HRQOL, and to investigate whether or not the demographics and clinical data including sex, age, marital status, occupational status, exercise status, BMI, history of smoking, history of drug abuse, history of alcohol consumption, history of diabetes, and hypertension would moderate this relationship.

Subjects and Methods

Design and Sample

This cross-sectional study was conducted within the framework of Amol cohort health study (phase 1; 2008–2011). In this cohort, a total of 7,104 subjects aged 10–90 years were selected by cluster random sampling from Amol healthcare centers. Nine hundred sixty persons at baseline were excluded due to unwillingness to participate, moving, or pregnancy. Thus, this study was conducted in 6,140 participants. All of them underwent a complete physical examination and fasting blood samples were obtained for assessment of fasting blood sugar and the lipid profile. A transabdominal ultrasonography was performed on each participant. Ultrasonography was performed by a senior radiologist using previously published methods [5]. Subjects with any signs or symptoms of liver diseases were referred for more specific evaluations.

Definition of Suspected NASH

Liver biopsy remains the gold standard for diagnosis of the degree of hepatosteatosis and inflammatory activity and NASH [13]. Also a previous study revealed that age, glucose level, diastolic blood pressure, systolic blood pressure, BMI, and lipid profile are associated with the diagnosis of NAFLD [14]. Because liver biopsy is an invasive technique it was not done in the present study, but patients with fatty liver on transabdominal ultrasonography along with an elevated serum level of alanine aminotransferase without any other liver diseases were considered "suspected" NASH patients.

Definition of MetS

MetS was defined based on fulfillment of at least 3 of the 5 components of the National Cholesterol Education Program Adult Treatment Panel III criteria as follows [15]: waist circumference > 102 cm (40 in) for males and >88 cm (35 in) for females, blood pressure ≥130/≥85 mm Hg, fasting glucose ≥100 mg/dL, triglycerides ≥150 mg/dL, and HDL cholesterol <40 mg/dL for males and <50 mg/dL for females.

Study Population

Patients were selected based on our definition of suspected NASH. Exclusion criteria were: (1) age <18 years, (2) having other known liver diseases, and (3) unwillingness to participate in this study. The research was explained to all of the participants and written consent was obtained from each one.

Three hundred thirty-nine subjects with suspected NASH were detected from all of the participants (6,140 persons). Seven questionnaires had more than 20% missing data and thus were excluded from this study. Therefore, 332 subjects with suspected NASH who had complete sociodemographic, clinical, and HRQOL data were recruited for data analysis.

Table 1. Characteristics of the study population

Characteristic	Patients, *n* (%)
Sex	
Male	236 (71.1)
Female	96 (28.9)
Age	
<42 years	162 (48.8)
≥42 years	170 (51.2)
Education level	
Diploma (academic)	176 (53)
No diploma	156 (47)
Marital status	
Married	288 (86.7)
Single	44 (13.3)
Occupational status[1]	
Active	136 (43.5)
Retired	177 (56.5)
Obesity	
No	15 (4.5)
Yes	317 (95.5)
Exercise status	
No	249 (75)
Yes	83 (25)
History of smoking	
No	280 (84.3)
Yes	52 (15.7)
Passive smoker	
No	226 (68.1)
Yes	106 (31.9)
History of drug abuse	
No	205 (61.7)
Yes	127 (38.3)
History of alcohol drinking	
No	296 (89.2)
Yes	36 (10.8)
History of diabetes	
No	293 (88.3)
Yes	39 (11.7)
History of hypertension	
No	235 (70.8)
Yes	97 (29.2)
Metabolic syndrome	
No	188 (56.6)
Yes	144 (43.4)

There were 332 patients in total. [1] Some missing data exist for this variable.

Data Collection

Twelve-Item Short-Form Questionnaire

The 12-Item Short-Form Questionnaire (SF-12) is a multidimensional questionnaire on HRQOL. This questionnaire had been previously developed and tested among the general Iranian population [16]. The SF-12 contains a Likert scale format including 12 items and 8 HRQOL subscales derived from aggregated items. The SF-12 subscales were: (1) physical functioning (2 items), (2) role limitations due to physical problems (RP) (2 items), (3) bodily pain (BP) (1 item), (4) general health (1 item), (5) vitality (VT) (1 item), (6) social functioning (SF) (1 item), (7) role limitations due to emotional problems (RE) (2 items), and (8) mental health (MH) (2 items). In summary, subscales 1–4 covered the Physical Component Summary (PCS) and subscales 5–8 covered the Mental Component Summary (MCS). The items were computed based on scores of 0–100, where 0 indicated the lowest level of health measured and 100 indicated the highest level of health measured [17]. Eight subscales and 2 summary components of the SF-12 questionnaire were considered as dependent variables.

Sociodemographic and Clinical Factors Questionnaire (except MetS and Its Components)

Demographic and clinical data included gender (male or female), age (≤42 years or >42 years), marital status (married or single), occupational status (retired or active), exercise status (having daily regular physical activity; yes or no), obesity (yes or no), history of smoking (yes or no), history of drug abuse (yes or no), history of alcohol consumption (yes or no), history of diabetes (yes or no), and history of hypertension (yes or no) and were considered covariates in this study.

Statistical Analysis

Statistical evaluations were performed using IBM SPSS Statistics for Windows (SPSS), version 20.0 (IBM Corp., Armonk, NY, USA). A descriptive analysis (frequencies, percentages, ranges, means, and SD) of the sociodemographic and clinical factors is reported. The Kolmogorov-Smirnov test was used to assess the normality of the data. The Pearson correlation coefficient was used to determine the level of agreement between the 8 subscales of the SF-12. The univariate test (*t* independent) was used to investigate the association between subjects' HRQOL and independent and covariate variables in the first step. Multivariable linear regression models (with the backward method) were used to assess the independent effect of MetS on HRQOL. Transformed scores were used for statistical analyses in all subscales. $p < 0.2$ in univariate analyses and $p < 0.05$ in multivariable analyses were considered statistically significant.

Results

Demographic and other pertinent data are shown in Table 1. The mean age of the study population was 42 ± 13 years (range 18–82), the mean BMI was 31.5± 4.7, and 144 (43.4%) subjects had MetS.

Among the different subscales of the SF-12, the lowest and highest mean scores were observed in SF subscale (mean: 20.9 ± 25.6) and the BP subscale (mean: 77.8 ± 27.9),

Table 2. Correlation coefficients for the PCS, the MCS and the 8 subscales of the SF-12

	PF	RP	BP	GH	VT	SF	RE	MH	MCS	PCS
PF	1	0.661**	0.553**	−0.287**	−0.429**	−0.348**	0.465**	−0.410**	−0.229**	0.833**
RP		1	0.438**	−0.226**	−0.391**	−0.324**	0.534**	−0.425**	−0.152*	0.822**
BP			1	−0.521**	−0.397**	−0.410**	0.350**	−0.440**	−0.345**	0.605**
GH				1	0.341**	0.135*	−0.169*	0.291**	0.262**	−0.025
VT					1	0.358**	−0.390**	0.556**	0.674**	−0.371**
SF						1	−0.415**	0.463**	0.570**	−0.401**
RE							1	−0.562**	0.085	0.514**
MH								1	0.538**	−0.429**
MCS									1	−0.198**
PCS										1

PF, physical functioning; RP, role limitations due to physical problems; BP, bodily pain; GF, general health; VT, vitality; SF, social functioning; RE, role limitations due to emotional problems; MH, mental health; PCS, Physical Component Summery; MCS, Mental Component Summary; SF-12, 12-Item Short-Form Health Survey. * Correlation is significant at the <0.05 level (2-tailed). ** Correlation is significant at the <0.001 level (2-tailed).

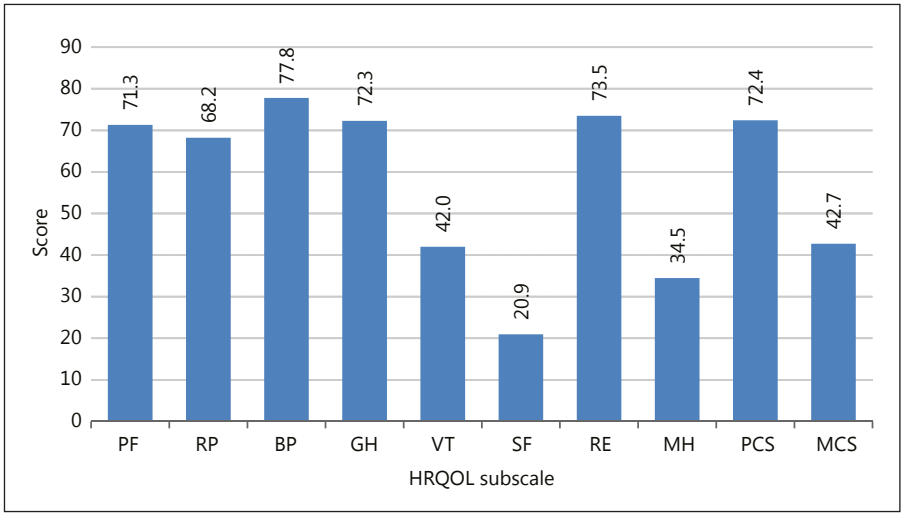

Fig. 1. Subscales and components of health-related quality of life (HRQOL) in the study population. PF, physical functioning; RP, role limitations due to physical problems; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role limitations due to emotional problems; MH, mental health; PCS, Physical Component Summary; MCS, Mental Component Summary.

respectively. Also, the mean scores on the PCS and MCS were 72.4 ± 20.86 and 42.7 ± 12.42, respectively (Fig. 1).

The correlations between the 8 subscales of the SF-12 are presented in Table 2; as can be observed, there were statistically significant correlations between all of the subscales. There were also statistically significant correlations between the summary components (PCS and MCS) and the scores obtained from the majority of the subscales.

For sociodemographic and clinical factors, a using *t*-independent test, age, marital status, occupational status, exercise status, BMI, history of drug abuse, history of diabetes, and history of hypertension (Table 3) were related to some subscales of HRQOL ($p < 0.2$). MetS was related to more subscales of HRQOL. Gender and passive smoker were not related to any subscales in the univariate analysis ($p \geq 0.2$).

In the multivariable analysis, MetS was significantly related to four subscales of HRQOL including: RP (B = −14.05, $p = 0.004$), BP (B = −7.37, $p = 0.02$), VT (B = −7.72, $p = 0.022$) and RE (B: −12.67, $p = 0.005$) after adjustment for other variables. Borderline relationships were observed in the general health and MH subscales and the PCS. A borderline relationship was also observed between exercise activity and the MH subscale ($B = -4.70$, $p = 0.087$), between occupational status and the RP subscale ($B = -8.38$, $p = 0.083$), and between exercise status and the physical functioning subscale ($B = 7.73$, $p = 0.099$). A borderline relationship was observed between

Table 3. Mean scores of the different subscales of HRQOL in the study population

Variable	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Sex										
Male	71.4±37.1	67.2±43.2	77.4±28.1	71.4±25.7	43±31.3	20.9±25.3	72.6±42.8	35.3±22.3	71.8±21.2	43±12.6
Female	71.1±36.9	70.8±40.2	78.6±27.4	74.5±25.9	39.4±28.8	20.8±26.3	75.5±41	32.5±19.6	73.7±20.1	42±11.8
p value	0.95	0.47	0.72	0.32	0.30	0.96	0.56	0.26	0.45	0.53
Age										
≤42 years	71.3±37.7	69.4±42.1	78.7±29.1	70.3±26.5	41.2±29.9	21.4±26.7	73.4±41.3	34.6±22.1	72.4±22.1	42.7±12
>42 years	71.3±36.3	67.1±42.5	76.9±26.6	74.1±25	42.7±31.3	20.4±24.5	73.5±40.4	34.3±21.1	72.3±19.7	42.7±12.8
p value	0.99	0.60	0.56	0.18*	0.66	0.72	0.98	0.90	0.96	0.96
Education level										
Diploma (academic)	69.7±37.7	63.6±44.2	76.8±27.1	73.8±24.6	41.7±30.9	21.4±26.1	70.1±42.8	35.6±25.8	71±21.1	42.2±11.9
No diploma	73.1±36.1	73.4±39.5	78.8±28.7	70.5±27	42.3±30.3	20.3±25	77.2±38.2	33.1±21.3	73.9±20.5	43.2±12.9
p value	0.41	0.03*	0.51	0.24	0.86	0.7	0.11*	0.29	0.20	0.46
Marital status										
Married	70.4±37.1	66.8±42.4	77.4±27.7	73.1±25.5	42.4±30.9	21.5±25.7	72.4±41.2	34.8±21.7	72±20.6	43±12.3
Single	77.2±35.7	77.2±41	80.1±28.8	66.5±27	39±28.9	17±24.5	80.6±38.6	32±20.9	75.2±22	42.2±13.1
p value	0.25	0.13*	0.55	0.11*	0.50	0.28	0.18*	0.42	0.32	0.77
*Occupational status**										
Active	72.9±36.1	71.7±39.7	80±26.6	71±21.6	40.1±29.5	20.7±27.8	75±40.8	32.7±20.8	73.8±20.2	42.1±11.6
Retired	71±37.6	65.5±43.9	72.1±27.6	72±25.8	42.7±31.9	21±26.2	72.6±40.9	35.4±22.5	71.6±21.2	42.9±12.9
p value	0.65	0.196*	0.55	0.71	0.46	0.96	0.61	0.27	0.35	0.59
Obesity										
No	78.3±35.1	56.6±45.7	80±30	66.6±24.3	40±26.1	31.6±33.3	86.6±29.6	27.3±21.5	70.4±22.7	46.4±12.2
Yes	70.9±37	68.7±42.1	77.6±27.6	72.5±25.8	42±30.8	20.4±25.1	72.8±41.2	34.8±21.6	72.5±20.8	42.5±12.4
p value	0.64	0.19	0.55	0.71	0.46	0.96	0.60	0.26	0.35	0.58
Exercise status										
No	69.3±37.8	67.8±42	77.1±27.5	71.4±26.1	42.2±30.5	21.4±25.7	71.4±41.7	35.8±21.8	71.4±20.8	42.7±12.2
Yes	77.1±33.6	69.2±43.3	79.8±28.8	75±24.7	41.2±30.9	19.2±25	79.5±37.4	30.4±20.6	75.3±20.9	42.6±12
p value	0.08*	0.79	0.44	0.26	0.78	0.50	0.10*	0.05*	0.14*	0.93
History of smoking										
No	71.5±35.6	68.9±42.3	77.4±27.8	72.5±25.1	42±30.8	20.6±25.5	74.1±40.8	34±21.6	72.5±20.7	42.6±12.6
Yes	70.2±38.9	64.4±42.3	79.8±27.6	71.1±29	41.9±29.7	22.6±25.8	70.1±41.1	36.9±21.3	71.3±21.7	42.9±11.2
p value	0.81	0.48	0.57	0.75	0.98	0.61	0.52	0.37	0.70	0.90
Passive smoker										
No	69.9±36.9	68.1±42.4	77.1±28	72.2±25.2	42.7±31	21.4±26.2	73.8±40.6	34.6±21.9	71.8±20.6	43.1±12.6
Yes	74.2±36.9	68.4±42.1	79.2±27.4	72.4±26.9	40.3±29.8	19.8±24.3	72.6±41.4	34.1±20.9	73.5±21.4	41.7±11.8
p value	0.31	0.95	0.51	0.95	0.51	0.58	0.79	0.84	0.48	0.32
History of drug abuse										
No	71.2±37.3	67.5±42.9	78.6±29.2	70.7±26	41.4±31.5	20.9±26.2	74.3±40.1	34.3±22.1	72±21.7	42.8±12.9
Yes	71.4±36.4	69.2±41.3	76.3±25.4	74.8±25.2	42.8±29.1	20.8±24.5	72±42	34.6±20.8	72.9±19.4	42.5±11.5
p value	0.95	0.71	0.45	0.16*	0.69	0.97	0.61	0.91	0.69	0.88
History of alcohol drinking										
No	71.3±37	68±42.4	77.7±27.9	72.6±25.4	41.2±30.8	21.4±25.9	72.6±41.5	34.5±21.9	72.4±21.2	42.4±12.3
Yes	70.8±37	69.4±28.7	77.7±27.2	69.4±28.7	47.7±28.7	16.6±22.3	80.5±34.3	33.6±19.4	71.8±17.7	44.6±13
p value	0.93	0.85	0.99	0.48	0.23	0.29	0.20	0.79	0.87	0.32
History of diabetes										
No	71.2±36.9	68±42.5	77.3±28.7	72.7±25.6	42.1±30.5	21.1±25.9	74.5±40.2	34.7±21.8	72.3±21.1	43.1±12.6
Yes	71.7±37.6	69.2±40.7	80.7±20.2	69.2±26.5	40.5±31.6	19.2±23.2	65.3±44.6	32.3±19.9	72.7±18.6	39.3±10
p value	0.93	0.87	0.35	0.43	0.74	0.65	0.22	0.050*	0.91	0.07*
History of hypertension										
No	70±37.3	67.6±42.3	77.2±27.4	71.3±25.9	40±31.7	21.4±25.8	71.9±41.3	34.5±21.9	71.5±20.7	41.9±12.5
Yes	74.4±36	69.5±42.4	79.1±29	74.4±25.2	46.8±27.3	19.5±25	77.3±39.5	34.4±20.9	74.4±21.1	44.5±11.8
p value	0.31	0.70	0.57	0.32	0.06*	0.53	0.27	0.97	0.25	0.08*
Metabolic syndrome										
No	73.9±35.6	72±40.77	80.9±25.4	70.2±26.9	46.3±30.5	19.5±25.5	78.9±39.6	32.3±20.7	74.3±20	42.3 ±12.3
Yes	67.5±38.5	63.1±43.8	73.6±30.2	75±24	38.6±30.3	22.7±25.5	66.3±43.7	37.2±22.4	69.9±21.6	43.1±12.4
p value	0.14*	0.06*	0.017*	0.08*	0.02*	0.26	0.006*	0.03*	0.061*	0.55

HRQOL, health-related quality of life; PF, physical functioning; RP, role limitations due to physical problems; BP, bodily pain; GF, general health; VT, vitality; SF, social functioning; RE, role limitations due to emotional problems; MH, mental health; PCS, Physical Component Summary; MCS, Mental Component Summary. * Significant at $p < 0.2$.

Table 4. Multivariable analysis of independent variables in relation to 8 dimensions and 2 summary components of HRQOL

Independent variables	QOL subscale									
	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Sex (female)	–	–	–	–	–	–	–	–	–	–
Age (>42 years)	–	–	–	0.68	–	–	–	–	–	–
Educational level (no diploma)	–	0.24	–	–	–	–	0.44	–	–	–
Marital status (single)	–	0.17	–	0.12	–	–	0.25	–	–	–
Occupational status (retired)	–	0.083*	–	–	–	–	–	–	–	–
Obesity (yes)	–	0.21	–	–	–	–	–	–	–	–
Exercise status (yes)	0.099*	–	–	–	–	–	0.22	0.076*	0.22	–
History of smoking (yes)	–	–	–	–	–	–	–	–	–	–
Passive smoker (yes)	–	–	–	–	–	–	–	–	–	–
History of drug abuse (yes)	–	–	–	0.33	–	–	–	–	–	–
History of alcohol drinking (yes)	–	–	–	–	–	–	–	–	–	–
History of diabetes (yes)	–	–	–	–	–	–	–	0.19	–	0.067*
History of hypertension (yes)	–	–	–	–	0.155	–	–	–	–	0.083*
Metabolic syndrome (yes)	0.2	0.004**	0.017**	0.094*	0.022**	–	0.005**	0.065*	0.058*	–

HRQOL, health-related quality of life; PF, physical functioning; RP, role limitations due to physical problems; BP, bodily pain; GF, general health; VT, vitality; SF, social functioning; RE, role limitations due to emotional problems; MH, mental health; PCS, Physical Component Summery; MCS, Mental Component Summery. * Significant at $p < 0.1$. ** Significant at $p < 0.05$.

diabetes ($B = -3.86$, $p = 0.067$) and hypertension ($B = 2.59$, $p = 0.083$) in relation to the MCS. Age, education level, marital status, obesity, and drug use did not have any relationship with the HRQOL subscales or the summary components ($p > 0.05$) (Table 4).

Discussion

In the present study, the mean BP and SF scores were highest and lowest among the SF-12 subscales. Thus, in approximately 23% of the participants, the mean BP subscale score implied that pain interfered with their normal work and the mean SF subscale score implied that approximately 79% of the participants had a problem engaging in social interactions, interpersonal relationships, and activities of independent living. Moreover, the mean MCS score was lower than the mean PCS score. Therefore, we can conclude that mental health problems were more important than physical problems. Furthermore, our finding regarding MCS and PCS did not concur with studies by Sayiner et al. [18], David et al. [19], and Afendy et al. [20]. Our study indicates impairment of HRQOL among patients with suspected NASH that is comparable with previous reports [21, 22]. In their studies, Golabi et al. [23] and Sarrafzadegan et al. [24] illustrated a noticeable QOL impairment in NAFLD [23, 24].

MetS is a chronic and progressive condition that influences different aspects of the personal health status such as physical, mental, and even sexual functions [25, 26]. The prevalence of MetS in countries such as Iran has been increasing in recent years [27]. As a result, it may have an impact on mental and physical statuses and, eventually, QOL. Despite the many studies on MetS, studies regarding MetS and QOL are limited, particularly among patients with NAFLD/NASH. In the present study, we showed that MetS is significantly associated with decreased RP, BP, VT, and RE subscale scores after adjusting for other study variables. It also had a borderline association with general health, MH, and the PCS. Sarrafzadegan et al. [24], in a population-based study, observed a significant difference between the physical health domain of HRQOL in women with and those without MetS [24].

The effect of MetS on the health consequences of patients with NAFLD/NASH is an understudied determinant of health situations, but enhancing the awareness of the medical community about the harmful prevalence of MetS among patients with NAFLD/NASH is essential. More detailed studies are needed to promote our knowledge on the relationship between MetS and the HRQOL of patients with NAFLD/NASH to develop programs for improving HRQOL among these patients. In addition, previous studies have revealed that visceral fat as a risk factor for developing insulin resistance has a great influ-

ence on the development of Mets and NAFLD. Therefore, as a result, the reduction of visceral fat may influence the improvement of MetS and its adverse effects, such as NAFLD and cardiovascular disease [28, 29].

The limitations of this study include its cross-sectional nature and not using factors, such as local residence and ethnicity, that might have impacted the results. The SF-12 is a self-reported HRQOL instrument that might be affected by factors that are not related to MetS.

Conclusion

In this study, patients with suspected NASH showed a relatively strong association between MetS and the scores on 4 subscales (RP, BP, VT, and RE) of HRQOL, which could consequently play a role in advancing the disease. Therefore, HRQOL might play an important role in the development of NAFLD/NASH.

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Disclosure Statement

None.

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